probe. When catheters of the prior art have been employed as a uni-polar probe, an additional reference electrode, that is not a part of the inserted catheter, is needed to complete the electrical circuit path. In such an arrangement, a second catheter is transveneously placed into the heart and this second catheter electrode function as the reference electrode. **U.S. Patent No. 4,920,980** describes uni-polar and bi-polar application of cardiac catheters.

At **page 6,** please rewrite the first full paragraph as follows:

Typically, the main body of these catheters comprises a flexible tube constructed from polyurethane, nylon or some other electrically non-conductive flexible material with braided steel wires or other non metallic fibers in its wall as reinforcing elements. An early example of such construction is that shown and described in **U.S. Patent 3,416,531** issued to M.L. Edwards. Catheters of this type are available in two general categories: **a)** those having a non-deflectable distal portion, an example of which is shown and described in **U.S. Patent 3,190,286** issued to R.W. Stokes, and **b)** those having a deflectable distal portion, as for example in the catheter shown and described in **U.S. Patent 3,605,725** issued to I.E. Bentov. The distal portion of the deflectable type catheters is typically made from non-braided flexible tube. This portion can be deformed into a variety of curved configurations with different radii of curvature by means of user input to a manual actuator on the catheter handle. The actuator is commonly internally linked to the catheter distal portion or the tip electrode by at least one steel tension or pull wire.

At **page 9,** please rewrite the second paragraph as follows:

In the aforesaid **U.S. Pat. 5,273,535** issued to Edwards, et al., a catheter is disclosed with **two** manual actuators on the catheter handle; one actuator is employed for formation of curvature at the distal portion of the catheter; and, the other actuator is used for retention of curvature or locking. This catheter requires two independent manual actions on both actuators in order to form and retain a desired radius of curvature on the distal portion of the catheter. Therefore, the catheter of **U.S. Patent 5,273,535** (Edwards, et al.) fails to satisfy

A3 a simultaneous curvature formation and curvature retention at the distal portion of the catheter by a single action of the operator's hand.

At **page 23,** please rewrite the first paragraph as follows:

A4 Figure 42 is a view similar to Figure 40 show in an alternate embodiment of the distal end of the catheter of Figure 40;

At **page 23,** please rewrite the third paragraph as follows:

A5 Figure 44 is an enlarged view of the proximal end of the catheter of the present invention illustrating the attachment of the tension/compression members to the sliders;

At **page 23,** please rewrite the fourth paragraph as follows:

A6 Figure 45 is a longitudinal section view of an embodiment of the invention employing a self positioning friction brake for the actuator of the handle;

At **page 23,** please rewrite the sixth paragraph as follows:

A7 Figure 47 is a schematic view of the sliders of the handle of the present invention showing a displacement transducer;

At **page 23,** please rewrite the seventh paragraph as follows:

A8 Figure 48 is a perspective view of the catheter of the present invention employing a collar thereon for enabling a user to apply torque to the braided outer casing tube of the catheter;

At **page 24**, please rewrite the first paragraph as follows:

A9 Figure 51 is a view of the step subsequent to the step of Figure 50;

At **page 27**, please rewrite the first full paragraph as follows:

Figure 4 shows an enlarged sectional view of the pull/push mechanism of the catheter handle **4**. The proximal end of the inner guide tube **9** is seated on the catheter handle nose **15** that is attached to an end block or body **113** of handle **4**. The tension/compression members **11** and **12** are each fixed at one end to the distal end of the guide tube **9** in the region **10**. The other end of each of the tension/compression members **11** and **12** is attached to one of the push/pull length adjuster units **16** and **17** that are slidingly mounted in grooves on slots **114**, ~~114~~ 115 mounted in block **113**. With this arrangement, the distal portion **10** of the inner guide tube **9** can be formed into a curved configuration by user movement of the manual actuator member **18** in either transverse direction as indicated by the dashed outline in Figure 4 about pivot point **19** by which actuator **18** is mounted to block **113** in a through-slot **116**.

At **pages 42-43**, please rewrite the paragraph that bridges these pages as follows:

Referring to Figure 21, the external electrical connector **186** of actuator subassembly **182** of Figures 20b, 20c, and 20d is shown where each of the ring electrical connectors **186** has an end of one of the lead wires **230, 232, 234, 236,** attached thereto. It will be understood that each of the leads **230-236** has its opposite end connected to one of the connectors **184** externally of handle **182**.

At **page 48,** please rewrite the second paragraph as follows:

Referring to Figures 21 and 32, another embodiment of the invention is indicated generally at **300** and has a solid distal electrode that in the present practice of the invention has been formed satisfactorily from platinum material and is denoted by reference numeral **302**. The electrode **302** has the distal ends of a pair of tension/compression members **304, 306** secured therein as, for example by weldment, which in the present practice of the invention comprises a brazed joint **308**. It will be understood that the distal portions of the tension/compress members **304, 306** have generally flattened rectangular transverse cross-sections as illustrated in Figure 32.

At **page 49,** please rewrite the first full paragraph as follows:

It will be understood that the tension/compression members' transition to a round or wire-like configuration is denoted by reference numeral **304', 306'** in a manner similar to the embodiment of Figures 2b and 3a of the present invention. In the embodiment of Figures 31 and 32, a thin wall plastic tubing **318** is received over the distal flattened portions of the tension/compression members **304, 306** and the plastic tube is received over, in closely fitting arrangement, an annular sleeve or collar **320** secured to the weldment or brazed joint of the distal electrode. In the present practice of the invention, the collar **320** is formed of stainless steel material. The plastic tube **318** extends over the round cross-section portion **304', 306'** of the tension/compression members; and, the tube **318** also extends over the distal end of an inner guide tube **322** which in the present practice of the invention comprise a closed coil stacked helical spring member.

A13

At **page 49,** please rewrite the second paragraph as follows:

A thin wall preferably stainless steel tubular member **324** is received over the tension/compression members **304', 306'** and the tube **324** has one end thereof crimped to a flattened cross-section as denoted by reference numeral **326** and the member **324** serves to constrain the tension/compression member from twisting or rotation with respect to the outer casing **325** and **330** during flexing of the distal portion of the catheter. An outer blood-contacting casing comprising a tubular flexible plastic member **325** has the distal end thereof attached to a reduced diameter portion of the distal electrode **302** and extends over the tube **318** and has the opposite end thereof received over a thin-wall relatively short annular sleeve member **328**. Sleeve **328** serves to join the outer casing member **325** with the outer casing **330** that is reinforced with braided material as denoted by reference numeral **332**. With reference to Figure 31, a plurality of annular electrodes are received over the periphery of the casing member **325** and are disposed in spaced arrangement therealong with each of the electrodes having an electrical wire lead member connected thereto as denoted by reference numerals **334, 336** for the electrodes and **338, 340** for the wire leads in Figure 31.

A14

At **page 50,** please rewrite the first paragraph as follows:

It will be understood that the catheter **300** is intended to be operated by the handle mechanism illustrated in Figure 1 wherein the slider members are connected to the tension/compression members **304, 306** such that movement of the actuator causes one slider to tension one of the members **304, 306** and the other of the members is placed in compression; and, reversed movement of the actuator wherein the handle causes the other of the tension/compression members to be tensioned and the one to be placed in compression.

At **page 50,** please rewrite the second paragraph as follows:

Referring to Figures 33 through 37, another embodiment of the electrophysiology/ablation catheter of the present invention is indicated generally at **400** and has a construction generally identical to that of the catheter **300** of Figure 31, with the exception that the inner guide tube **302** is formed of plastic material and has two generally circular longitudinally extending lumens **404, 406** formed thereto to which are received the tension/compression members **408, 410.**

At **page 50,** please rewrite the third paragraph as follows:

It will be understood that in the embodiment **400,** tension/compression members **404, 406** have flattened distal portions **404', 406'** as illustrated in detail in Figures 36 and 37; and, the embodiment **400** also employs the spacer means comprising a wave-shaped flat spring **416** with one end thereof secured in a kinematic junction **426** in a manner identical to that of embodiment **300** of Figure 31.

At **page 51,** please rewrite the first paragraph as follows:

Referring to Figure 39, the central lumen is denoted by reference numeral **420** and the side lumens are denoted by reference numerals **422** and **424.** In the embodiment **400,** the annular tube member forming the kinematic junction is denoted by reference numeral **426;** and the outer casing portion having the electrodes thereon is denoted by reference numeral

A18 **428** and the braided portion of the outer casing is denoted by reference numeral **430** and the distal electrode is denoted by reference numeral **432**.

At **page 52,** please rewrite the second paragraph as follows:

The embodiment **600** of Figure 41 also includes a temperature sensor **616** embedded in the distal electrode **602**, which in the present practice of the invention may be a solid state junction device which has leads **618, 620** extending within the casing **610** to the A19 proximal end of the catheter. The sensor **616** is intended for use in remote monitoring of the temperature of the distal electrode **602** during ablation procedures.

At **page 52,** please rewrite the third paragraph as follows:

Referring to Figures 42 and 43, an alternate version of the embodiment **600** is illustrated wherein the catheter assembly indicated generally at **700** is identical to the A20 embodiment **600** with the exception that the catheter **700** does not include a heating element in its distal electrode **702**; and instead, the temperature of the distal electrode **702** is controlled by a radio-frequency power supply/control module that is external to the catheter **700**.

At **pages 52-53,** please rewrite the paragraph that bridges these pages as follows:

Referring to Figure 44, another embodiment of the catheter handle is indicated generally at **800** and has the proximal end of the guide tube **802** received in a tubular member **804** in a closely fitting arrangement with the tension/compression members **806, 808** extending from the proximal end of the guide tube **802** and through the tube member **804** for A21 connection to a pair of slider blocks **810** and **812** which corresponds in shape and function to the sliders **16** and **17** of Figure 5. The proximal ends of each of the tension/compression members **806, 808** each have a closely fitting thin wall preferably stainless steel tube **814, 816** received respectively thereover.

At **pages 54-55,** please rewrite the paragraph that bridges these pages as follows:

Referring to Figures 49 through 54, the technique for installing one of the annular electrodes over the outer casing at the distal portion of the catheter is illustrated and will be described hereinafter with respect of Figures 49 through 54. Referring to Figure 49, an annular electrode **1000** has an electrical conductive lead **1002** attached to the interior periphery thereof and extending outwardly therefrom. The flexible outer casing tubing **1004** has an end thereof received over a rigid tubing such as **1008** which serves as a part of a holding vise for the tubing **1004**. The free end of the electrical lead **1002** is then passed through an aperture **1006** on the flexible outer casing tube **1004** and then is passed outwardly through the end of the tubing **1008** as shown in Figure 50.

In the Claims:

Please **cancel claims 12 - 40** from further consideration herein, subject to applicant's right to pursue the subject matter in a divisional application during the pendency of this application, or any continuation application thereof.

Please **amend claims 1, 2, 3, 5, and 7** as follows. (A copy of the Claims marked to show the amendments made thereto is attached as **Exhibit B**.)

1. (Amended) An electrophysiology/ablation catheter comprising:

a) an elongated flexible hollow tubular casing having a proximal end and a distal end and a plurality of spaced electrodes disposed at the distal end thereof;

b) a pair of flexible tension/compression members disposed in side by side relationship and extending in the hollow of said casing from a point of attachment adjacent said distal end to said proximal end of said tubular casing;

c) an electrical lead connected to each of said electrodes and extending through the hollow of said tubular casing to the proximal end thereof, said lead adapted for external connections thereto;

d) spacer means disposed between said pair of flexible tension/compression members at said distal end for maintaining lateral spacing between said members, said spacer means being flexible; and

e) a handle including an actuator moveable in opposite directions and operative for effecting upon movement in one direction longitudinal tensioning of a first of said tension/compression members and simultaneous longitudinal compressing of the second of said tension/compression members with respect to said casing which effects lateral displacement of said distal end of said casing in one direction and upon movement in a direction opposite said one direction operative for effecting longitudinal tensioning of the said second of tension/compression members with respect to said casing which effects lateral displacement of said distal end of said casing in a direction opposite said one direction.

A23

2. (Amended) The catheter defined in Claim 1, wherein said pair of tension/compression members each have a portion thereof adjacent said distal end with a flattened transverse section.

3. ~~3.~~ (Amended) The catheter defined in Claim 1, wherein said spacer means comprises a spring member.

7. ~~5.~~ (Amended) The catheter defined in Claim 1, wherein each of said tension/compression members has substantially rectangular transverse section in the region adjacent the distal end with the balance thereof having a generally circular cross-section.

A24

3. ~~7.~~ (Amended) The catheter defined in Claim 2, further comprising a sleeve received over said flattened portion of said tension/compression members and spaced a preselected distance from said distal end, said tension/compression members secured therein and forming a kinematic junction at said sleeve, wherein the portion of said tubular casing distal said sleeve remains substantially un-deformed upon simultaneous tensioning and compressing of said tension /compression members.

A25

Please add new claims 41-49 as follows:

12. ~~41.~~ An electrophysiology/ablation catheter comprising:

a) an elongated flexible hollow casing having a proximal end and a distal end and a plurality of spaced electrodes disposed at the distal end thereof;

b) first and second flexible tension/compression members disposed and extending in the hollow of said casing from a point of attachment adjacent said distal end to said proximal end of said casing;

c) an electrical lead connected to each of said electrodes and extending through the hollow of said casing to the proximal end thereof, said lead adapted for external connections thereto;

d) a flexible spacer disposed between the first and second flexible tension/compression members at said distal end for maintaining lateral spacing between said members; and

A26

e) a handle including an actuator moveable in opposite directions and operative for effecting upon movement longitudinal tensioning of the first tension/compression member and simultaneous longitudinal compressing of the second tension/compression member with respect to the casing which effects lateral displacement of the distal end of the casing in a desired direction.

13. ~~42.~~ The catheter defined in Claim ~~41~~ 12, wherein the first and second tension/compression members each have a portion thereof adjacent the distal end with a flattened transverse section.

14. ~~43.~~ The catheter defined in Claim ~~41~~ 12, wherein the flexible spacer is a spring.

15. ~~44.~~ The catheter defined in Claim ~~41~~ 12, wherein the first and second flexible tension/compression members each have a substantially rectangular transverse section adjacent the distal end.

68

1A

16. ~~45.~~ The catheter defined in Claim ~~44~~ 15 wherein the first and second flexible tension/compression members are secured to one another and form a kinematic junction adjacent the substantially rectangular transverse sections.

17. ~~46.~~ The catheter defined in Claim ~~45~~ 16 wherein the flexible spacer has a first end secured to the first and second flexible tension/compression members at the kinematic junction.

AU4

18. ~~47.~~ The catheter defined in Claim ~~46~~ 17 wherein the flexible spacer has a second end floating in space between the first and second flexible tension/compression members.

19. ~~48.~~ The catheter defined in Claim ~~41~~ 12 wherein the first and second flexible tension/compression members have flattened transverse sections adjacent the distal end, and the catheter further comprises a sleeve received over the flattened sections.

20. ~~49.~~ The catheter defined in Claim ~~48~~ 19 wherein the first and second flexible tension/compression members are secured to one another and form a kinematic junction adjacent the flattened sections.

REMARKS

Applicants have studied the Office Action of July 19, 2001 in detail, along with the references both cited and applied. In response, selected claims have been amended and other claims have been canceled. Reexamination and reconsideration of the application as amended are respectfully requested.

Responsive to the Examiner's objection, a photocopy of Figure 4 is enclosed with the proposed drawing changes to correct reference numerals marked in red thereon for which the Examiner's approval is requested.

In the specification, on page 49, and at other appropriate locations, changes have been made to correct errors in grammar and syntax.

64